



## TFT LCD Approval Specification

# MODEL NO.: N133I6 - L03

## Rev. C1

Customer: Apple/ QSMC

Approved by:

Note:

| 記錄                         | 工作                   | 審核                               | 角色       | 投票     |
|----------------------------|----------------------|----------------------------------|----------|--------|
| 2008-11-26<br>18:15:55 CST | PMMD III<br>Director | annie_hsu(徐凡琇<br>/56522 / 54873) | Director | Accept |



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**CHI MEI**  
OPTOELECTRONICS CORP.

Doc No.:

Issued Date: Nov. 20, 2008

Model No.: N133I6 - L03

**Approval****REVISION HISTORY**

| Version | Date        | Page (New) | Section | Description                              |
|---------|-------------|------------|---------|------------------------------------------|
| 3.0     | Nov, 20,'08 | All        | All     | Approval specification was first issued. |

## 1. GENERAL DESCRIPTION

### 1.1 OVERVIEW

N133I6 - L03 is a 13.3" TFT Liquid Crystal Display module with LED Backlight unit and 30 pins LVDS interface. This module supports 1280 x 800 WXGA mode and can display 262,144 colors. The optimum viewing angle is at 6 o'clock direction. The converter module for Backlight is not built in.

### 1.2 FEATURES

- Thin and Light Weight
- WXGA (1280 x 800 pixels) resolution
- DE only mode
- 3.3V LVDS (Low Voltage Differential Signaling) interface with 1 pixel/clock

### 1.3 APPLICATION

- TFT LCD Notebook

### 1.4 GENERAL SPECIFICATIONS

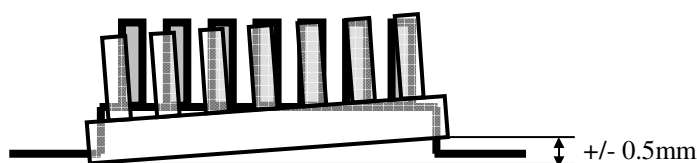
| Item              | Specification                          | Unit  | Note |
|-------------------|----------------------------------------|-------|------|
| Active Area       | 286.08 (H) x 178.8 (V)                 | mm    | (1)  |
| CF Polarizer      | 289.48 (H) x 182.2 (V)                 | mm    |      |
| Driver Element    | a-si TFT active matrix                 | -     | -    |
| Pixel Number      | 1280 x R.G.B. x 800                    | pixel | -    |
| Pixel Pitch       | 0.2235 (H) x 0.2235 (V)                | mm    | -    |
| Pixel Arrangement | RGB vertical stripe                    | -     | -    |
| Display Colors    | 262,144                                | color | -    |
| Transmissive Mode | Normally white                         | -     | -    |
| Surface Treatment | Glare, N2T (Reflection rate< 0.5%), 3H | -     | -    |

### 1.5 MECHANICAL SPECIFICATIONS

| Item                            |               | Min.                                                                                               | Typ.   | Max.   | Unit | Note |
|---------------------------------|---------------|----------------------------------------------------------------------------------------------------|--------|--------|------|------|
| Module Size                     | Horizontal(H) | 296.85                                                                                             | 297.15 | 297.45 | mm   | (1)  |
|                                 | Vertical(V)   | --                                                                                                 | 203.15 | --     | mm   |      |
|                                 | Depth(D)      | --                                                                                                 | --     | 3.045  | mm   |      |
| Weight                          |               | ---                                                                                                | 216    | 219    | g    | -    |
| I/F connector mounting position |               | The mounting inclination of the connector makes the screen center within ±0.5mm as the horizontal. |        |        |      | (2)  |

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) Connector mounting position



## 2. ABSOLUTE MAXIMUM RATINGS

### 2.1 ABSOLUTE RATINGS OF ENVIRONMENT

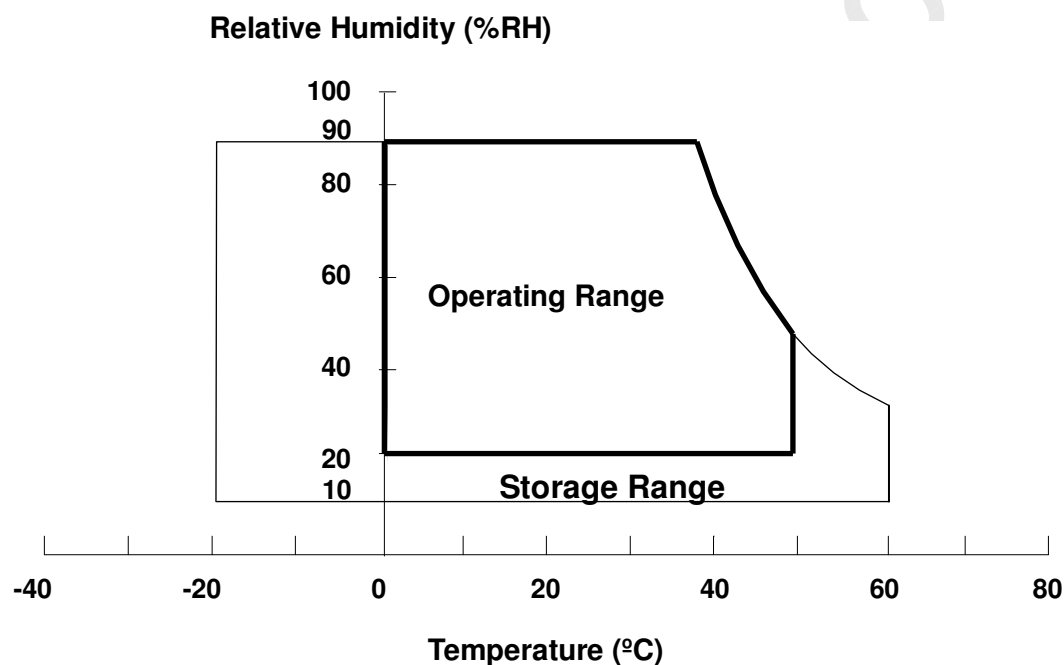
| Item                          | Symbol           | Value |       | Unit | Note     |
|-------------------------------|------------------|-------|-------|------|----------|
|                               |                  | Min.  | Max.  |      |          |
| Storage Temperature           | T <sub>ST</sub>  | -20   | +60   | °C   | (1)      |
| Operating Ambient Temperature | T <sub>OP</sub>  | 0     | +50   | °C   | (1), (2) |
| Shock (Non-Operating)         | S <sub>NOP</sub> | -     | 220/2 | G    | (3), (5) |
| Vibration (Non-Operating)     | V <sub>NOP</sub> | -     | 1.5   | G    | (4), (5) |

Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. ( $T_a \leq 40\text{ }^{\circ}\text{C}$ ).

(b) Wet-bulb temperature should be 39 °C Max. ( $T_a > 40\text{ }^{\circ}\text{C}$ ).

(c) No condensation.



Note (2) The temperature of panel surface should be 0 °C Min. and 50 °C Max.

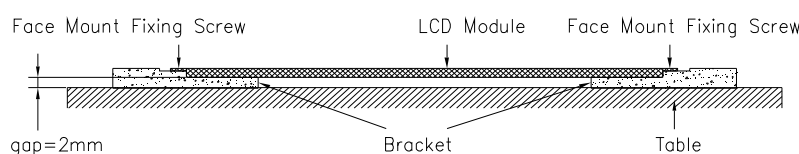
Note (3) 1 time for  $\pm X, \pm Y, \pm Z$ . for Condition (220G / 2ms) is half Sine Wave,.

Note (4) 10 ~ 500 Hz, 0.5 Hr / Cycle, 1 cycles for each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.

The fixing condition is shown as below:

At Room Temperature



## 2.2 ELECTRICAL ABSOLUTE RATINGS

### 2.2.1 TFT LCD MODULE

| Item                 | Symbol          | Value |                      | Unit | Note |
|----------------------|-----------------|-------|----------------------|------|------|
|                      |                 | Min.  | Max.                 |      |      |
| Power Supply Voltage | V <sub>CC</sub> | -0.3  | +4.0                 | V    | (1)  |
| Logic Input Voltage  | V <sub>IN</sub> | -0.3  | V <sub>CC</sub> +0.3 | V    |      |

### 2.2.2 BACKLIGHT UNIT

| Item                               | Value |      | Unit | Note |
|------------------------------------|-------|------|------|------|
|                                    | Min   | Max. |      |      |
| LED Light Bar Power Supply Voltage | 0     | 34   | V    | (1)  |
| LED Light Bar Power Supply Current | 0     | 150  | mA   |      |

Note (1) Permanent damage to the device may occur if maximum or minimum values are exceeded.

Function operation should be restricted to the conditions described under Normal Operating Conditions.

### 3. ELECTRICAL CHARACTERISTICS

#### 3.1 TFT LCD MODULE

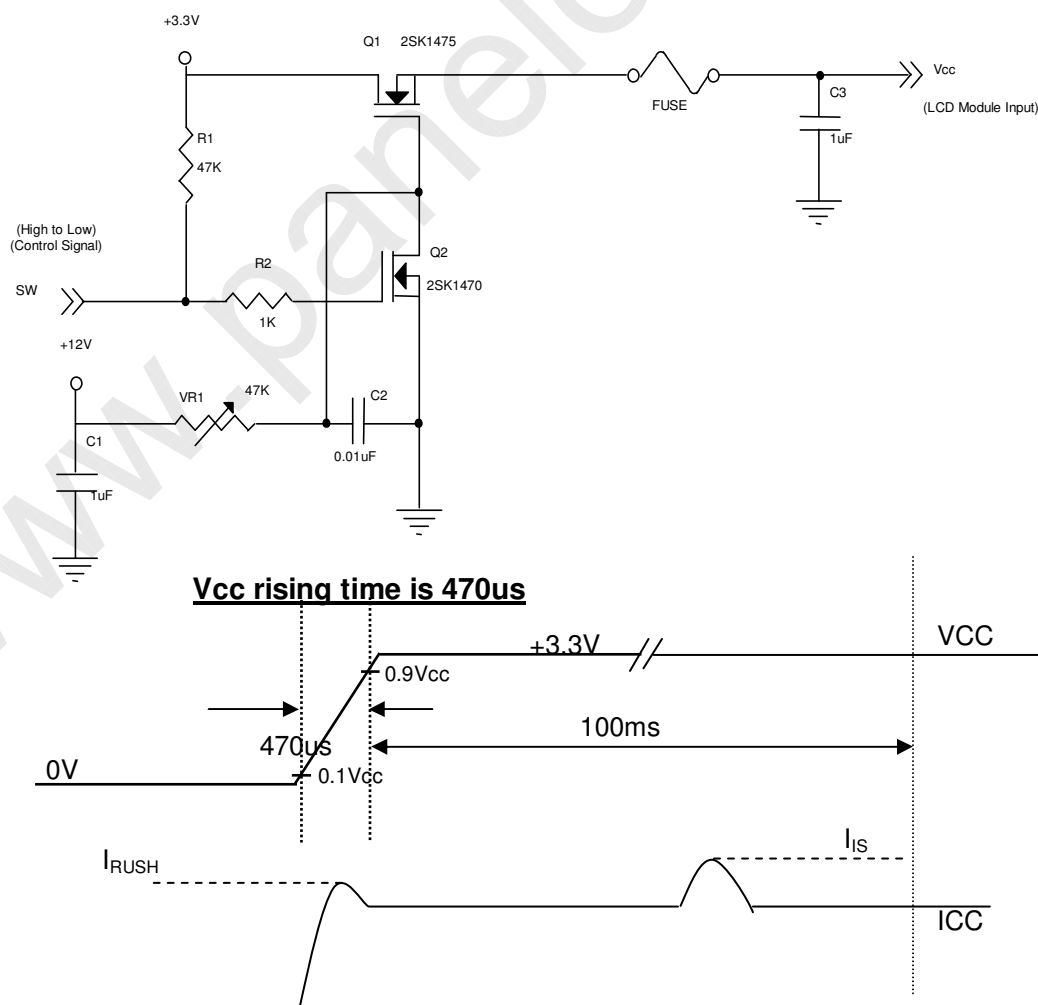
| Parameter                              | Symbol                | Value |      |       | Unit | Note                          |
|----------------------------------------|-----------------------|-------|------|-------|------|-------------------------------|
|                                        |                       | Min.  | Typ. | Max.  |      |                               |
| Power Supply Voltage                   | V <sub>CC</sub>       | 3.0   | 3.3  | 3.6   | V    | -                             |
| Permissible Ripple Voltage             | V <sub>RP</sub>       | -     | 50   | -     | mV   | -                             |
| Rush Current                           | I <sub>RUSH</sub>     | -     | -    | 1.5   | A    | (2)                           |
| Initial Stage Current                  | I <sub>IS</sub>       | -     | -    | 1.0   | A    | (2)                           |
| Power Supply Current                   | White                 | -     | 170  | 210   | mA   | (3)a                          |
|                                        | Black                 |       | 230  | 270   | mA   | (3)b                          |
| LVDS Differential Input High Threshold | V <sub>TH(LVDS)</sub> | -     | -    | +100  | mV   | (5),<br>V <sub>CM</sub> =1.2V |
| LVDS Differential Input Low Threshold  | V <sub>TL(LVDS)</sub> | -100  | -    | -     | mV   | (5),<br>V <sub>CM</sub> =1.2V |
| LVDS Common Mode Voltage               | V <sub>CM</sub>       | 1.125 | -    | 1.375 | V    | (5)                           |
| LVDS Differential Input Voltage        | V <sub>ID</sub>       | 100   | -    | 600   | mV   | (5)                           |
| Terminating Resistor                   | R <sub>T</sub>        | -     | 100  | -     | Ohm  |                               |
| Power per EBL WG                       | P <sub>EBL</sub>      | -     | 1.2  | -     | W    | (4)                           |

Note (1) The ambient temperature is Ta = 25 ± 2 °C.

Note (2) I<sub>RUSH</sub>: the maximum current when VCC is rising

I<sub>IS</sub>: the maximum current of the first 100ms after power-on

Measurement Conditions: Shown as the following figure. Test pattern: black.



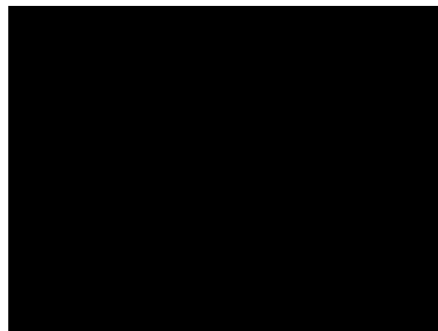
Note (3) The specified power supply current is under the conditions at  $V_{CC} = 3.3\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$ ,  $f_v = 60\text{ Hz}$ , whereas a power dissipation check pattern below is displayed.

a. White Pattern



Active Area

b. Black Pattern

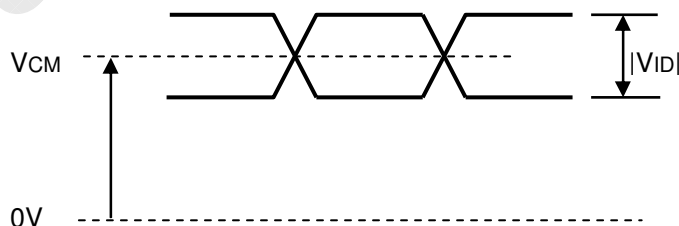
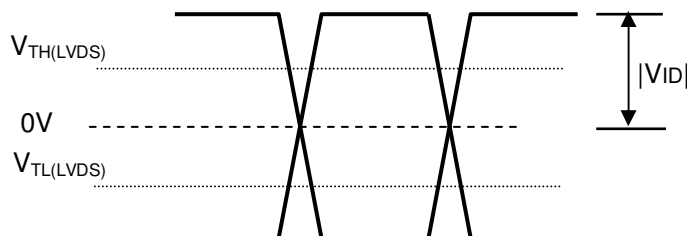


Active Area

Note (4) The specified power are the sum of LCD panel electronics input power and the converter input power. Test conditions are as follows.

- (a)  $V_{CC} = 3.3\text{ V}$ ,  $T_a = 25 \pm 2\text{ }^{\circ}\text{C}$ ,  $f_v = 60\text{ Hz}$ ,
- (b) The pattern used is a black and white 32 x 36 checkerboard, slide #100 from the VESA file "Flat Panel Display Monitor Setup Patterns", FPDMSU.ppt.
- (c) Luminance: 60 nits.
- (d) The converter used is provided from [Apple](#). Please contact them for detail information.  
CMO doesn't provide the converter in this product.

Note (5) The parameters of LVDS signals are defined as the following figures.

**Single Ended****Differential**

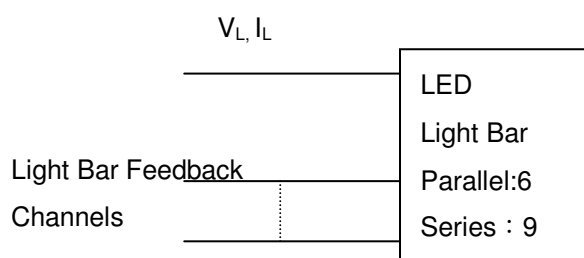


## 3.2 BACKLIGHT UNIT

Ta = 25 ± 2 °C

| Parameter                          | Symbol          | Value |      |      | Unit | Note                |
|------------------------------------|-----------------|-------|------|------|------|---------------------|
|                                    |                 | Min.  | Typ. | Max. |      |                     |
| LED Quantity                       |                 | 54    |      |      | PCs  | (1)                 |
| LED Light Bar Power Supply Voltage | V <sub>L</sub>  | 27    | 28.8 | 30.6 | V    | (1),(2) (Duty 100%) |
| LED Light Bar Power Supply Current | I <sub>L</sub>  | --    | 120  | --   | mA   |                     |
| Power Consumption                  | P <sub>L</sub>  | --    | 3.46 | --   | W    | (3), (Duty 100%)    |
| LED Life Time                      | L <sub>BL</sub> | 10000 | --   | --   | Hrs  | (4)                 |

Note (1) LED light bar configuration is shown as below.



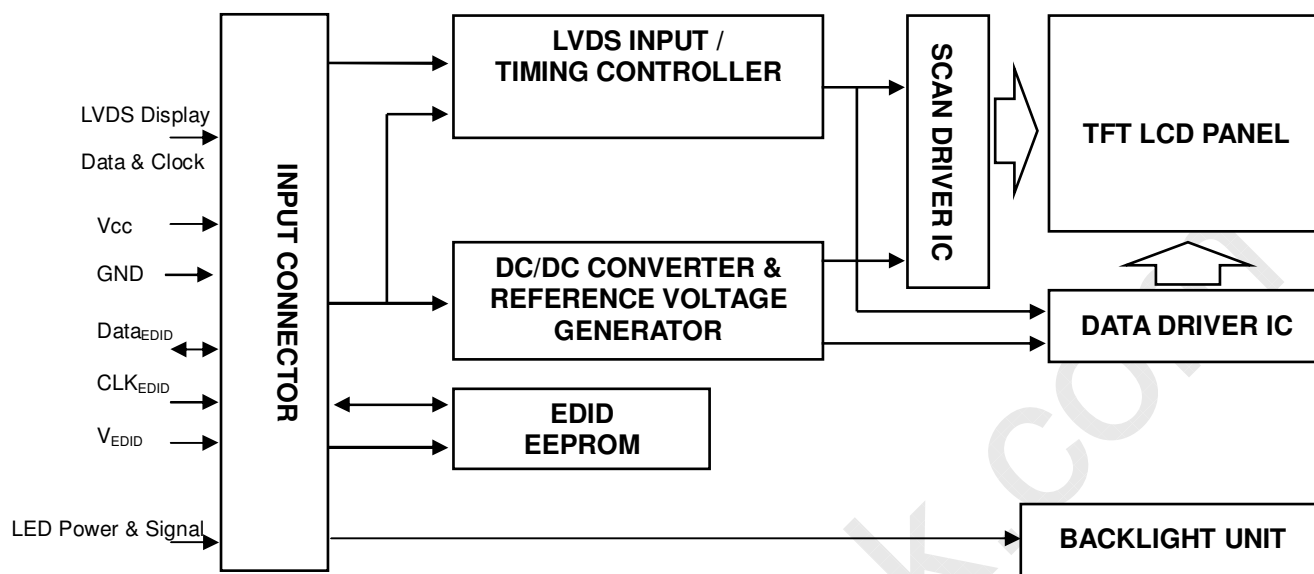
Note (2) For better LED light bar driving quality, it is recommended to utilize the adaptive boost converter with current balancing function to drive LED light-bar.

Note (3)  $P_L = I_L \times V_L$

Note (4) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ± 2 °C and I<sub>L</sub> = 20 mA(Per EA) until the brightness becomes ≤ 50% of its original value.

## 4. BLOCK DIAGRAM

### 4.1 TFT LCD MODULE





## 5. INPUT TERMINAL PIN ASSIGNMENT

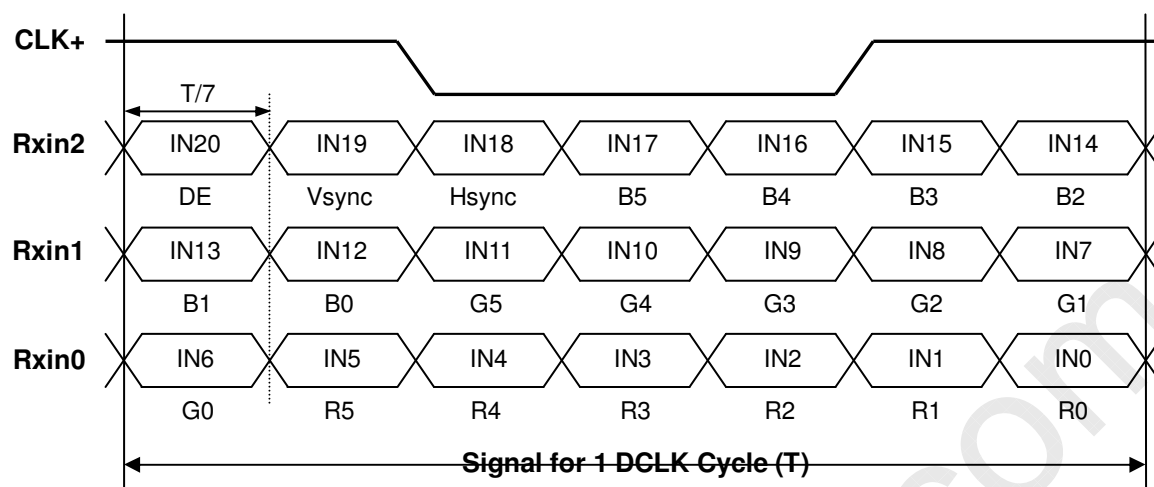
### 5.1 TFT LCD MODULE

| Pin | Symbol               | Description                   | Polarity | Remark                  |
|-----|----------------------|-------------------------------|----------|-------------------------|
| 1   | Vss                  | Ground                        |          |                         |
| 2   | Vcc                  | Power Supply +3.3 V (typical) |          |                         |
| 3   | Vcc                  | Power Supply +3.3 V (typical) |          |                         |
| 4   | V <sub>EDID</sub>    | DDC 3.3V Power                |          | DDC 3.3V Power          |
| 5   | NC                   | No connect                    |          |                         |
| 6   | CLK <sub>EDID</sub>  | DDC Clock                     |          | DDC Clock               |
| 7   | DATA <sub>EDID</sub> | DDC Data                      |          | DDC Data                |
| 8   | Rxin0-               | LVDS Differential Data Input  | Negative | R0~R5,G0                |
| 9   | Rxin0+               | LVDS Differential Data Input  | Positive |                         |
| 10  | Vss                  | Ground                        |          |                         |
| 11  | Rxin1-               | LVDS Differential Data Input  | Negative | G1~G5, B0, B1           |
| 12  | Rxin1+               | LVDS Differential Data Input  | Positive |                         |
| 13  | Vss                  | Ground                        |          |                         |
| 14  | Rxin2-               | LVDS Differential Data Input  | Negative | B2~B5, DE, Hsync, Vsync |
| 15  | Rxin2+               | LVDS Differential Data Input  | Positive |                         |
| 16  | Vss                  | Ground                        |          |                         |
| 17  | CLK-                 | LVDS Clock Data Input         | Negative | LVDS Level Clock        |
| 18  | CLK+                 | LVDS Clock Data Input         | Positive |                         |
| 19  | Vss                  | Ground                        |          |                         |
| 20  | Vss                  | Ground                        |          |                         |
| 21  | Vdc(1&2&3)           | LED Annode (Positive)         |          |                         |
| 22  | Vdc(4&5&6)           | LED Annode (Positive)         |          |                         |
| 23  | NC                   | No connect                    |          |                         |
| 24  | Vdc1                 | LED Cathode (Negative)        |          |                         |
| 25  | Vdc2                 | LED Cathode (Negative)        |          |                         |
| 26  | Vdc3                 | LED Cathode (Negative)        |          |                         |
| 27  | Vdc4                 | LED Cathode (Negative)        |          |                         |
| 28  | Vdc5                 | LED Cathode (Negative)        |          |                         |
| 29  | Vdc6                 | LED Cathode (Negative)        |          |                         |
| 30  | Vss                  | Ground                        |          |                         |

Note (1) Connector Part No.: 20347-330E-12(I-PEX) or equivalent

Note (2) User's connector Part No: 20345-030T-12(I-PEX) or equivalent

## 5.3 TIMING DIAGRAM OF LVDS INPUT SIGNAL





## 5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 6-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

| Color               |               | Data Signal |    |    |    |    |    |       |    |    |    |    |    |      |    |    |    |    |    |
|---------------------|---------------|-------------|----|----|----|----|----|-------|----|----|----|----|----|------|----|----|----|----|----|
|                     |               | Red         |    |    |    |    |    | Green |    |    |    |    |    | Blue |    |    |    |    |    |
|                     |               | R5          | R4 | R3 | R2 | R1 | R0 | G5    | G4 | G3 | G2 | G1 | G0 | B5   | B4 | B3 | B2 | B1 | B0 |
| Basic Colors        | Black         | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Red           | 1           | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Green         | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Blue          | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 1    | 1  | 1  | 1  | 1  | 1  |
|                     | Cyan          | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  |
|                     | Magenta       | 1           | 1  | 1  | 1  | 1  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 1    | 1  | 1  | 1  | 1  | 1  |
|                     | Yellow        | 1           | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | White         | 1           | 1  | 1  | 1  | 1  | 1  | 1     | 1  | 1  | 1  | 1  | 1  | 1    | 1  | 1  | 1  | 1  | 1  |
| Gray Scale Of Red   | Red(0)/Dark   | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Red(1)        | 0           | 0  | 0  | 0  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Red(2)        | 0           | 0  | 0  | 0  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | Red(61)       | 1           | 1  | 1  | 1  | 0  | 1  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Red(62)       | 1           | 1  | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
| Red(63)             | 1             | 1           | 1  | 1  | 1  | 1  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  |    |
| Gray Scale Of Green | Green(0)/Dark | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Green(1)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Green(2)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | Green(61)     | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 0  | 1  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Green(62)     | 0           | 0  | 0  | 0  | 0  | 0  | 1     | 1  | 1  | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
| Green(63)           | 0             | 0           | 0  | 0  | 0  | 0  | 1  | 1     | 1  | 1  | 1  | 1  | 0  | 0    | 0  | 0  | 0  | 0  |    |
| Gray Scale Of Blue  | Blue(0)/Dark  | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 0  |
|                     | Blue(1)       | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 0  | 1  |
|                     | Blue(2)       | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 0  | 0    | 0  | 0  | 0  | 1  | 0  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | :             | :           | :  | :  | :  | :  | :  | :     | :  | :  | :  | :  | :  | :    | :  | :  | :  | :  | :  |
|                     | Blue(61)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 1    | 1  | 1  | 0  | 1  | 1  |
|                     | Blue(62)      | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 0  | 1  | 1    | 1  | 1  | 1  | 1  | 0  |
| Blue(63)            | 0             | 0           | 0  | 0  | 0  | 0  | 0  | 0     | 0  | 0  | 0  | 1  | 1  | 1    | 1  | 1  | 1  | 1  |    |

Note (1) 0: Low Level Voltage, 1: High Level Voltage

## 5.5 EDID DATA STRUCTURE

The EDID (Extended Display Identification Data) data formats are to support displays as defined in the VESA Plug & Display and FPD1 standards.

| Byte #<br>(decimal) | Byte #<br>(hex) | Field Name and Comments                             | Value<br>(hex) | Value<br>(binary) |
|---------------------|-----------------|-----------------------------------------------------|----------------|-------------------|
| 0                   | 0               | Header                                              | 00             | 00000000          |
| 1                   | 1               | Header                                              | FF             | 11111111          |
| 2                   | 2               | Header                                              | FF             | 11111111          |
| 3                   | 3               | Header                                              | FF             | 11111111          |
| 4                   | 4               | Header                                              | FF             | 11111111          |
| 5                   | 5               | Header                                              | FF             | 11111111          |
| 6                   | 6               | Header                                              | FF             | 11111111          |
| 7                   | 7               | Header                                              | 00             | 00000000          |
| 8                   | 8               | EISA ID manufacturer name ("APP")                   | 06             | 00000110          |
| 9                   | 9               | EISA ID manufacturer name (Compressed ASCII)        | 10             | 00010000          |
| 10                  | 0A              | ID product code (N133I6-L03)                        | 8F             | 10001111          |
| 11                  | 0B              | ID product code (hex LSB first; N133I6-L03)         | 9C             | 10011100          |
| 12                  | 0C              | ID S/N (fixed "0")                                  | 00             | 00000000          |
| 13                  | 0D              | ID S/N (fixed "0")                                  | 00             | 00000000          |
| 14                  | 0E              | ID S/N (fixed "0")                                  | 00             | 00000000          |
| 15                  | 0F              | ID S/N (fixed "0")                                  | 00             | 00000000          |
| 16                  | 10              | Week of manufacture (fixed "33")                    | 21             | 00100001          |
| 17                  | 11              | Year of manufacture (fixed "2008")                  | 12             | 00010010          |
| 18                  | 12              | EDID structure version # ("1")                      | 01             | 00000001          |
| 19                  | 13              | EDID revision # ("3")                               | 03             | 00000011          |
| 20                  | 14              | Video I/P definition ("digital")                    | 80             | 10000000          |
| 21                  | 15              | Max H image size ("29.7cm")                         | 1D             | 00011101          |
| 22                  | 16              | Max V image size ("19.2cm")                         | 13             | 00010011          |
| 23                  | 17              | Display Gamma (Gamma = "2.2")                       | 78             | 01111000          |
| 24                  | 18              | Feature support ("Active off, RGB Color")           | 0A             | 00001010          |
| 25                  | 19              | Red/Green (Rx1, Rx0, Ry1, Ry0, Gx1, Gx0, Gy1, Gy0)  | 5C             | 01011100          |
| 26                  | 1A              | Blue/White (Bx1, Bx0, By1, By0, Wx1, Wx0, Wy1, Wy0) | 80             | 10000000          |
| 27                  | 1B              | Red-x (Rx = "0.595")                                | 98             | 10011000          |
| 28                  | 1C              | Red-y (Ry = "0.345")                                | 58             | 01011000          |
| 29                  | 1D              | Green-x (Gx = "0.320")                              | 51             | 01010001          |
| 30                  | 1E              | Green-y (Gy = "0.555")                              | 8E             | 10001110          |
| 31                  | 1F              | Blue-x (Bx = "0.155")                               | 27             | 00100111          |
| 32                  | 20              | Blue-y (By = "0.145")                               | 25             | 00100101          |
| 33                  | 21              | White-x (Wx = "0.313")                              | 50             | 01010000          |
| 34                  | 22              | White-y (Wy = "0.329")                              | 54             | 01010100          |
| 35                  | 23              | Established timings 1                               | 00             | 00000000          |
| 36                  | 24              | Established timings 2 (1280x800@60Hz)               | 00             | 00000000          |
| 37                  | 25              | Manufacturer's reserved timings                     | 00             | 00000000          |
| 38                  | 26              | Standard timing ID # 1                              | 01             | 00000001          |
| 39                  | 27              | Standard timing ID # 1                              | 01             | 00000001          |
| 40                  | 28              | Standard timing ID # 2                              | 01             | 00000001          |
| 41                  | 29              | Standard timing ID # 2                              | 01             | 00000001          |



|    |    |                                                                                          |    |          |
|----|----|------------------------------------------------------------------------------------------|----|----------|
| 42 | 2A | Standard timing ID # 3                                                                   | 01 | 00000001 |
| 43 | 2B | Standard timing ID # 3                                                                   | 01 | 00000001 |
| 44 | 2C | Standard timing ID # 4                                                                   | 01 | 00000001 |
| 45 | 2D | Standard timing ID # 4                                                                   | 01 | 00000001 |
| 46 | 2E | Standard timing ID # 5                                                                   | 01 | 00000001 |
| 47 | 2F | Standard timing ID # 5                                                                   | 01 | 00000001 |
| 48 | 30 | Standard timing ID # 6                                                                   | 01 | 00000001 |
| 49 | 31 | Standard timing ID # 6                                                                   | 01 | 00000001 |
| 50 | 32 | Standard timing ID # 7                                                                   | 01 | 00000001 |
| 51 | 33 | Standard timing ID # 7                                                                   | 01 | 00000001 |
| 52 | 34 | Standard timing ID # 8                                                                   | 01 | 00000001 |
| 53 | 35 | Standard timing ID # 8                                                                   | 01 | 00000001 |
| 54 | 36 | Detailed timing description # 1 Pixel clock ("72.5MHz", According to VESA CVT Rev1.1)    | 52 | 01010010 |
| 55 | 37 | # 1 Pixel clock (hex LSB first)                                                          | 1C | 00011100 |
| 56 | 38 | # 1 H active ("1280")                                                                    | 00 | 00000000 |
| 57 | 39 | # 1 H blank ("160")                                                                      | A0 | 10100000 |
| 58 | 3A | # 1 H active : H blank ("1280 : 160")                                                    | 50 | 01010000 |
| 59 | 3B | # 1 V active ("800")                                                                     | 20 | 00100000 |
| 60 | 3C | # 1 V blank ("23")                                                                       | 17 | 00010111 |
| 61 | 3D | # 1 V active : V blank ("800 :23")                                                       | 30 | 00110000 |
| 62 | 3E | # 1 H sync offset ("48")                                                                 | 30 | 00110000 |
| 63 | 3F | # 1 H sync pulse width ("32")                                                            | 20 | 00100000 |
| 64 | 40 | # 1 V sync offset : V sync pulse width ("3 : 6")                                         | 36 | 00110110 |
| 65 | 41 | # 1 H sync offset : H sync pulse width : V sync offset : V sync width ("48: 32 : 3 : 6") | 00 | 00000000 |
| 66 | 42 | # 1 H image size ("286.08 mm")                                                           | 1E | 00011110 |
| 67 | 43 | # 1 V image size ("178.8 mm")                                                            | B2 | 10110010 |
| 68 | 44 | # 1 H image size : V image size ("286 : 178")                                            | 10 | 00010000 |
| 69 | 45 | # 1 H boarder ("0")                                                                      | 00 | 00000000 |
| 70 | 46 | # 1 V boarder ("0")                                                                      | 00 | 00000000 |
| 71 | 47 | # 1 Non-interlaced, Normal, no stereo, Separate sync, H/V pol Negatives                  | 18 | 00011000 |
| 72 | 48 | Detailed timing/monitor                                                                  | 00 | 00000000 |
| 73 | 49 | descriptor #2                                                                            | 00 | 00000000 |
| 74 | 4A |                                                                                          | 00 | 00000000 |
| 75 | 4B |                                                                                          | 01 | 00000001 |
| 76 | 4C | Version                                                                                  | 00 | 00000000 |
| 77 | 4D | Apple edid signature                                                                     | 06 | 00000110 |
| 78 | 4E | Apple edid signature                                                                     | 10 | 00010000 |
| 79 | 4F | Link Type (LVDS Link,MSB justified)                                                      | 20 | 00100000 |
| 80 | 50 | Pixel and link component format (6-bit panel interface)                                  | 00 | 00000000 |
| 81 | 51 | Panel features (No inverter)                                                             | 00 | 00000000 |
| 82 | 52 |                                                                                          | 00 | 00000000 |
| 83 | 53 |                                                                                          | 00 | 00000000 |
| 84 | 54 |                                                                                          | 00 | 00000000 |
| 85 | 55 |                                                                                          | 00 | 00000000 |
| 86 | 56 |                                                                                          | 00 | 00000000 |



|     |    |                                                                    |    |          |
|-----|----|--------------------------------------------------------------------|----|----------|
| 87  | 57 |                                                                    | 00 | 00000000 |
| 88  | 58 |                                                                    | 0A | 00001010 |
| 89  | 59 |                                                                    | 20 | 00100000 |
| 90  | 5A | Detailed timing description # 3                                    | 00 | 00000000 |
| 91  | 5B | # 3 Flag                                                           | 00 | 00000000 |
| 92  | 5C | # 3 Reserved                                                       | 00 | 00000000 |
| 93  | 5D | # 3 FE (hex) defines ASCII string (Model Name "N133I3-L03", ASCII) | FE | 11111110 |
| 94  | 5E | # 3 Flag                                                           | 00 | 00000000 |
| 95  | 5F | # 3 1st character of name ("N")                                    | 4E | 01001110 |
| 96  | 60 | # 3 2nd character of name ("1")                                    | 31 | 00110001 |
| 97  | 61 | # 3 3rd character of name ("3")                                    | 33 | 00110011 |
| 98  | 62 | # 3 4th character of name ("3")                                    | 33 | 00110011 |
| 99  | 63 | # 3 5th character of name ("I")                                    | 49 | 01001001 |
| 100 | 64 | # 3 6th character of name ("6")                                    | 36 | 00110110 |
| 101 | 65 | # 3 7th character of name ("-")                                    | 2D | 00101101 |
| 102 | 66 | # 3 8th character of name ("L")                                    | 4C | 01001100 |
| 103 | 67 | # 3 9th character of name ("0")                                    | 30 | 00110000 |
| 104 | 68 | # 3 9th character of name ("3")                                    | 33 | 00110011 |
| 105 | 69 | # 3 New line character indicates end of ASCII string               | 0A | 00001010 |
| 106 | 6A | # 3 Padding with "Blank" character                                 | 20 | 00100000 |
| 107 | 6B | # 3 Padding with "Blank" character                                 | 20 | 00100000 |
| 108 | 6C | Detailed timing description # 4                                    | 00 | 00000000 |
| 109 | 6D | # 4 Flag                                                           | 00 | 00000000 |
| 110 | 6E | # 4 Reserved                                                       | 00 | 00000000 |
| 111 | 6F | # 4 FC (hex) defines Monitor name ("Color LCD", ASCII)             | FC | 11111100 |
| 112 | 70 | # 4 Flag                                                           | 00 | 00000000 |
| 113 | 71 | # 4 1st character of name ("C")                                    | 43 | 01000011 |
| 114 | 72 | # 4 2nd character of name ("o")                                    | 6F | 01101111 |
| 115 | 73 | # 4 3rd character of name ("I")                                    | 6C | 01101100 |
| 116 | 74 | # 4 4th character of name ("o")                                    | 6F | 01101111 |
| 117 | 75 | # 4 5th character of name ("r")                                    | 72 | 01110010 |
| 118 | 76 | # 4 6th character of name (<space>)                                | 20 | 00100000 |
| 119 | 77 | # 4 7th character of name ("L")                                    | 4C | 01001100 |
| 120 | 78 | # 4 8th character of name ("C")                                    | 43 | 01000011 |
| 121 | 79 | # 4 9th character of name ("D")                                    | 44 | 01000100 |
| 122 | 7A | # 4 New line character # 4 indicates end of Monitor name           | 0A | 00001010 |
| 123 | 7B | # 4 Padding with "Blank" character                                 | 20 | 00100000 |
| 124 | 7C | # 4 Padding with "Blank" character                                 | 20 | 00100000 |
| 125 | 7D | # 4 Padding with "Blank" character                                 | 20 | 00100000 |
| 126 | 7E | Extension flag                                                     | 00 | 00000000 |
| 127 | 7F | Checksum                                                           | 2D | 00101101 |





## 6. INTERFACE TIMING

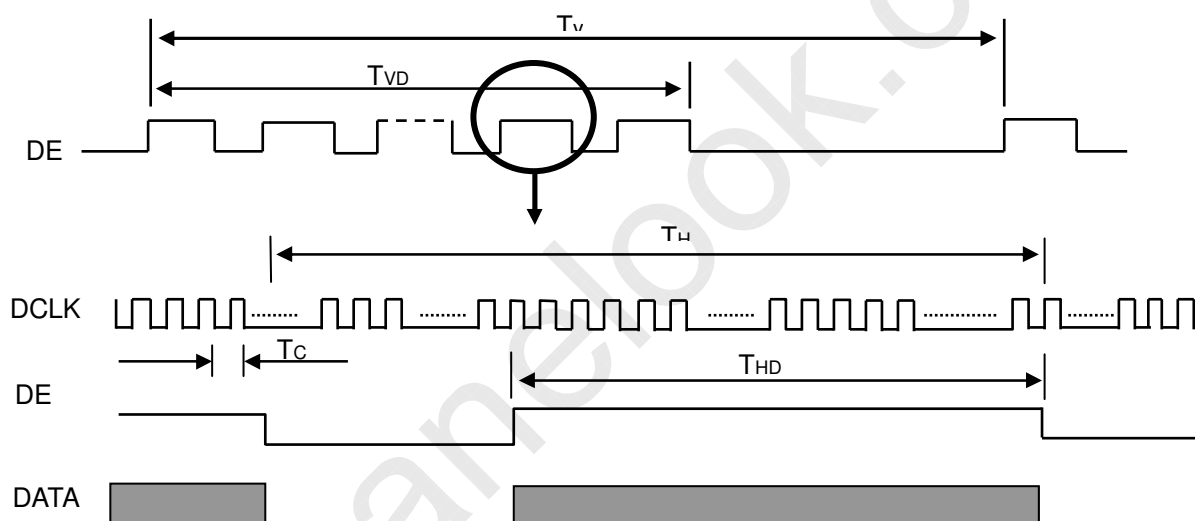
### 6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The specifications of input signal timing are as the following table and timing diagram.

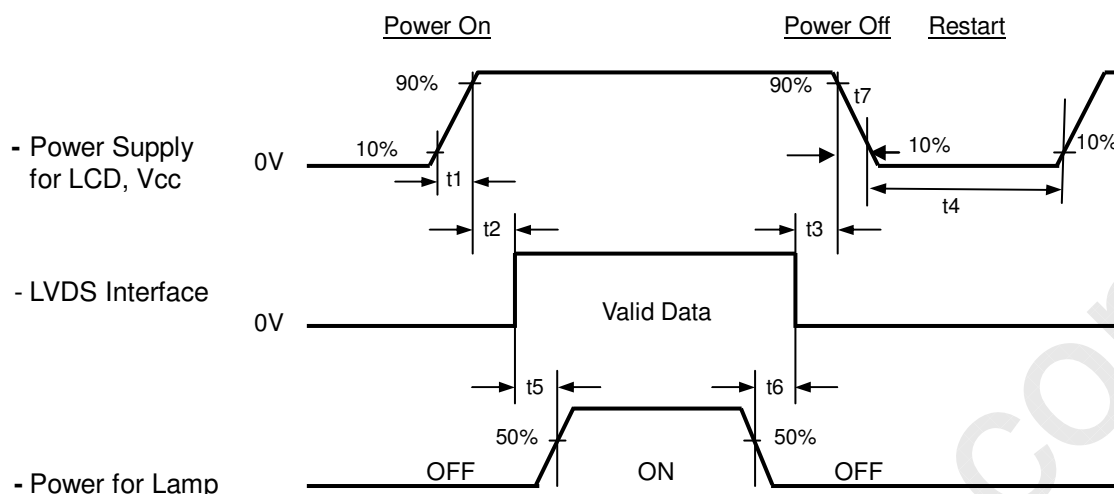
| Signal | Item                              | Symbol | Min.   | Typ. | Max.   | Unit | Note |
|--------|-----------------------------------|--------|--------|------|--------|------|------|
| DCLK   | Frequency                         | 1/Tc   | 50     | 71   | 80     | MHz  | -    |
| DE     | Vertical Total Time               | TV     | 803    | 823  | 1028   | TH   | -    |
|        | Vertical Addressing Time          | TVD    | 800    | 800  | 800    | TH   | -    |
|        | Vertical Active Blanking Period   | TVB    | TV-TVD | 23   | TV-TVD | TH   | -    |
|        | Horizontal Total Time             | TH     | 1362   | 1440 | 1800   | Tc   | -    |
|        | Horizontal Addressing Time        | THD    | 1280   | 1280 | 1280   | Tc   | -    |
|        | Horizontal Active Blanking Period | THB    | TH-THD | 160  | TH-THD | Tc   | -    |

Note (1) Because this module is operated by DE only mode, Hsync and Vsync are ignored.

#### INPUT SIGNAL TIMING DIAGRAM



## 6.2 POWER ON/OFF SEQUENCE



### Timing Specifications:

$$\begin{aligned}
 0.5 &\leq t1 \leq 10 \text{ ms} \\
 0 &\leq t2 \leq 50 \text{ ms} \\
 0 &\leq t3 \leq 50 \text{ ms} \\
 t4 &\geq 500 \text{ ms} \\
 t5 &\geq 200 \text{ ms} \\
 t6 &\geq 200 \text{ ms}
 \end{aligned}$$

Note (1) Please follow the power on/off sequence described above. Otherwise, the LCD module might be damaged.

Note (2) Please avoid floating state of interface signal at invalid period. When the interface signal is invalid, be sure to pull down the power supply of LCD Vcc to 0 V.

Note (3) The Backlight converter power must be turned on after the power supply for the logic and the interface signal is valid. The Backlight converter power must be turned off before the power supply for the logic and the interface signal is invalid.

Note (4) Sometimes some slight noise shows when LCD is turned off (even backlight is already off). To avoid this phenomenon, we suggest that the Vcc falling time is better to follow  $5 \leq t7 \leq 300 \text{ ms}$ .



## 7 OPTICAL CHARACTERISTICS

### 7.1 TEST CONDITIONS

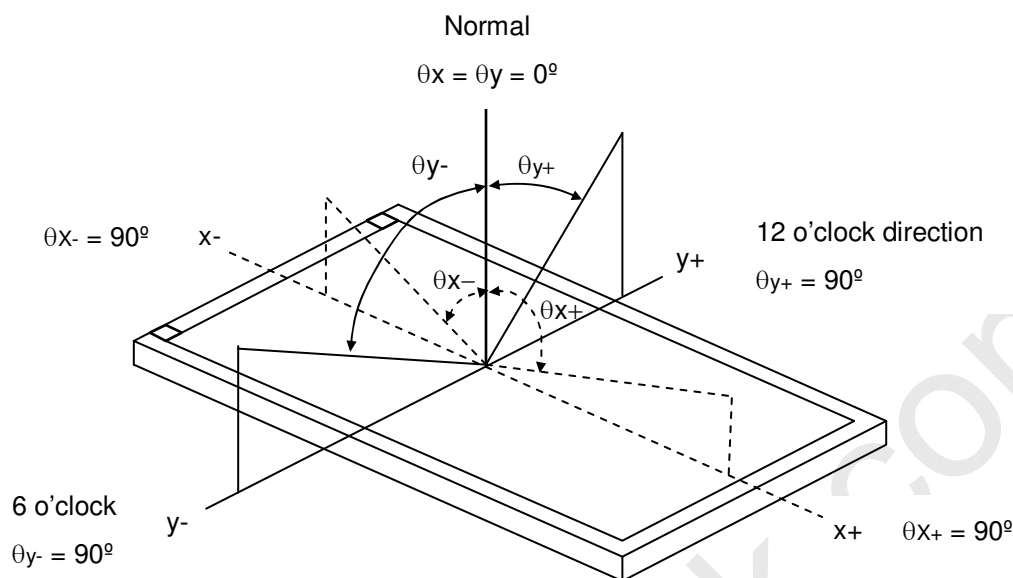
| Item                        | Symbol                                                        | Value | Unit |
|-----------------------------|---------------------------------------------------------------|-------|------|
| Ambient Temperature         | Ta                                                            | 25±2  | °C   |
| Ambient Humidity            | Ha                                                            | 50±10 | %RH  |
| Supply Voltage              | V <sub>CC</sub>                                               | 3.3   | V    |
| Input Signal                | According to typical value in "3. ELECTRICAL CHARACTERISTICS" |       |      |
| LED Light Bar Input Current | I <sub>L</sub>                                                | 120   | mA   |

The measurement methods of optical characteristics are shown in Section 7.2. The following items should be measured under the test conditions described in Section 7.1 and stable environment shown in Note (5).

### 7.2 OPTICAL SPECIFICATIONS

| Item                            |            | Symbol           | Condition                                                    | Min.  | Typ.  | Max.  | Unit              | Note      |
|---------------------------------|------------|------------------|--------------------------------------------------------------|-------|-------|-------|-------------------|-----------|
| Contrast Ratio                  |            | CR               | $\theta_x=0^\circ, \theta_Y=0^\circ$<br>Viewing Normal Angle | 300   | 400   |       | -                 | (2), (5)  |
| Response Time                   |            | T <sub>R</sub>   |                                                              | -     | 5     | 10    | ms                | (3)       |
|                                 |            | T <sub>F</sub>   |                                                              | -     | 11    | 16    | ms                |           |
| Center Luminance of White       |            | L <sub>ct</sub>  |                                                              | 338   | 413   |       | cd/m <sup>2</sup> | (4), (5)  |
| Luminance Uniformity            |            | U                |                                                              | 60    |       |       | %                 | (5), (8)  |
| Color Chromaticity              | Red        | R <sub>x</sub>   |                                                              | 0.575 | 0.600 | 0.625 | -                 | (5)       |
|                                 |            | R <sub>y</sub>   |                                                              | 0.325 | 0.345 | 0.365 | -                 |           |
|                                 | Green      | G <sub>x</sub>   |                                                              | 0.300 | 0.320 | 0.340 | -                 |           |
|                                 |            | G <sub>y</sub>   |                                                              | 0.535 | 0.555 | 0.575 | -                 |           |
|                                 | Blue       | B <sub>x</sub>   |                                                              | 0.130 | 0.150 | 0.170 | -                 |           |
|                                 |            | B <sub>y</sub>   |                                                              | 0.090 | 0.120 | 0.150 | -                 |           |
|                                 | White      | W <sub>x</sub>   |                                                              | 0.290 | 0.306 | 0.322 | -                 |           |
|                                 |            | W <sub>y</sub>   |                                                              | 0.311 | 0.327 | 0.343 | -                 |           |
| Cross-talk                      |            | D <sub>SHA</sub> |                                                              | -     | -     | 4     | %                 | (5), (6)  |
| Color Difference w.r.t. center  |            |                  |                                                              | -     | -     | 0.009 | -                 | (5), (9)  |
| Color Difference over panel     |            |                  |                                                              | -     | -     | 0.013 | -                 | (5), (10) |
| Color Difference worst neighbor |            |                  |                                                              | -     | -     | 0.005 | -                 | (5), (11) |
| Viewing Angle                   | Horizontal | $\theta_{x+}$    | CR≥10                                                        | 60    | 70    |       | Deg.              | (1)       |
|                                 |            | $\theta_{x-}$    |                                                              | 60    | 70    |       |                   |           |
|                                 | Vertical   | $\theta_{y+}$    |                                                              | 50    | 60    |       |                   |           |
|                                 |            | $\theta_{y-}$    |                                                              | 55    | 65    |       |                   |           |

Note (1) Definition of Viewing Angle ( $\theta_x$ ,  $\theta_y$ ):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

$$\text{Contrast Ratio (CR)} = L_{63} / L_0$$

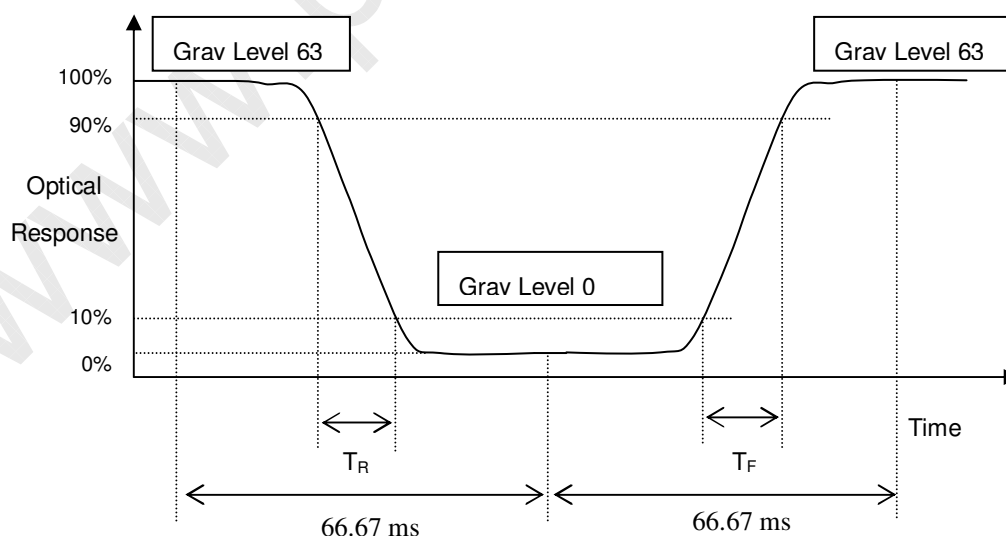
$L_{63}$ : Luminance of gray level 63

$L_0$ : Luminance of gray level 0

$$\text{CR} = \text{CR} (5)$$

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (7).

Note (3) Definition of Response Time ( $T_R$ ,  $T_F$ ):



Note (4) Definition of Center Luminance of White ( $L_{ct}$ ):

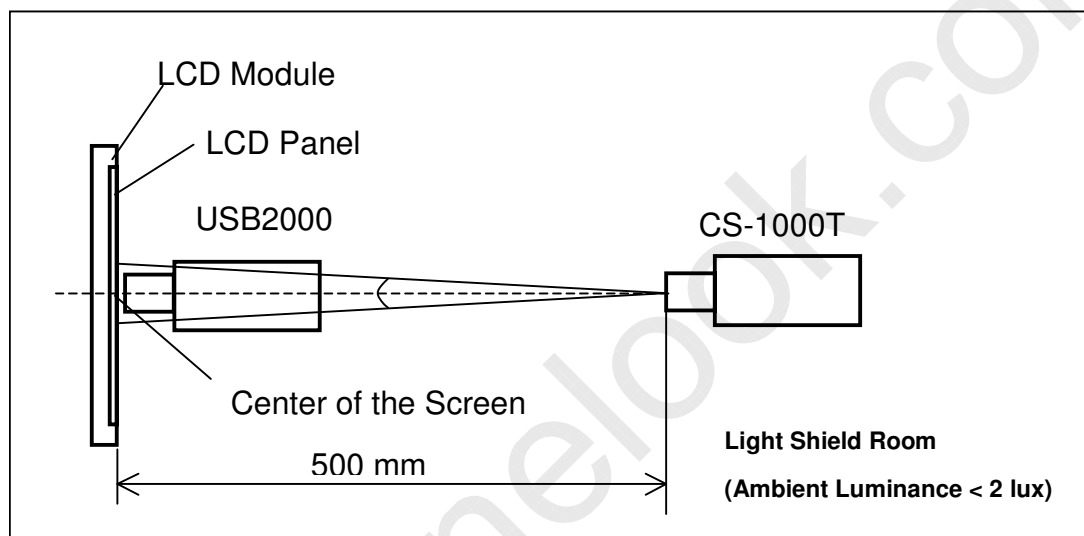
Measure the luminance of gray level 63 at center points

$$L_{ct} = L(5)$$

$L(x)$  is corresponding to the luminance of the point X at Figure in Note (7).

Note (5) Measurement Setup:

The LCD module should be stabilized at given temperature for 15 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 15 minutes in a windless room.



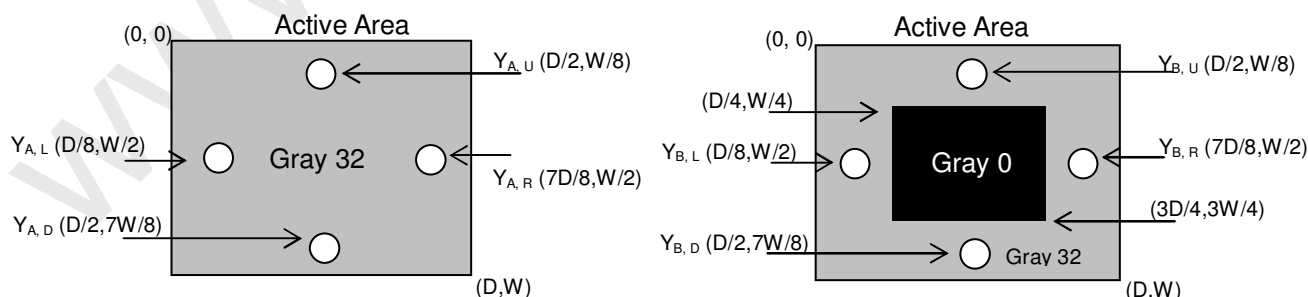
Note (6) Definition of Cross-talk ( $D_{SHA}$ )

$$D_{SHA} = |Y_B - Y_A| / Y_A \times 100 (\%)$$

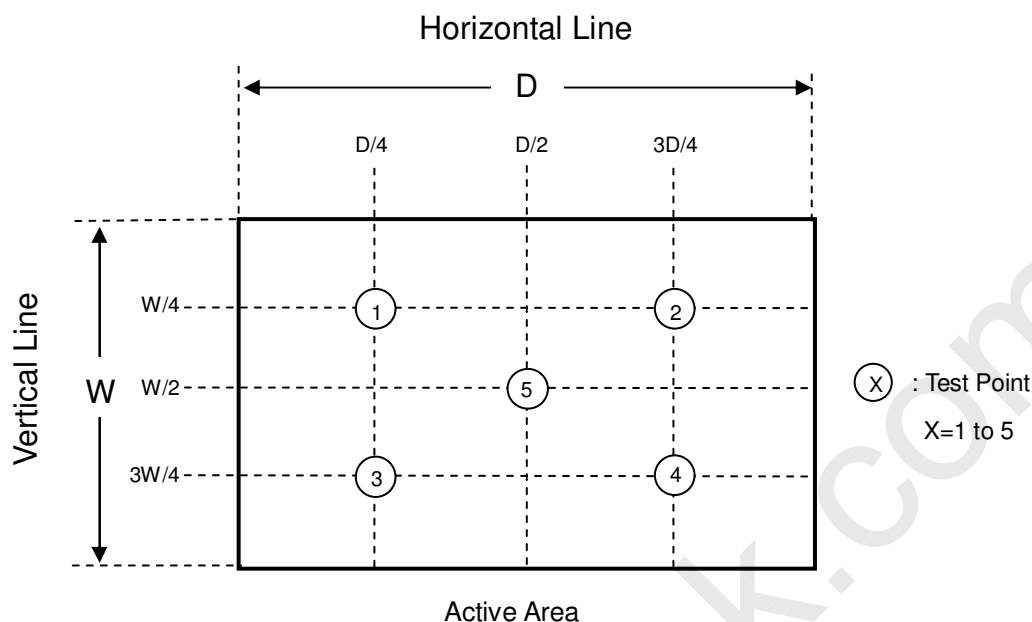
Where:

$Y_A$  = Luminance of measured location without gray level 0 pattern ( $\text{cd/m}^2$ )

$Y_B$  = Luminance of measured location with gray level 0 pattern ( $\text{cd/m}^2$ )



Note (7) Definition of measure point



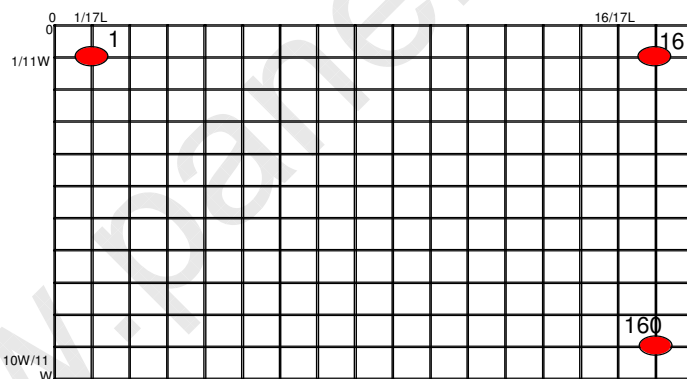
Note (8) Definition of Luminance Uniformity(U)

$$U = L_{\min}/L_{\max}$$

Where:

$L_{\max} = \max \{ \text{Luminance values at 160 points} \}$ ,

$L_{\min} = \min \{ \text{Luminance values at 160 points} \}$



Note (9) Definition of Color Difference with respect to the center

Center color coordinate is defined as the Average of points of 72, 73, 88, 89. where is corresponding to the measured point in Note (8)

$$\text{Color Difference} = [(u'_x - u'_c)^2 + (v'_x - v'_c)^2]^{1/2}$$

Where x is any point in Note (8), c is the center point.

Note (10) Definition of Color Difference over the panel

Color Difference between any two measured points over the 160 points

$$= [(u'_x - u'_y)^2 + (v'_x - v'_y)^2]^{1/2}$$

Where x, y is any two points in Note (8)

Note (11) Definition of Color Difference between two neighbor

Color Difference between any two neighboring points on the panel

$$= [(u'_x - u'_y)^2 + (v'_x - v'_y)^2]^{1/2}$$

Where x, y is any two neighbor points in Note (8)

## 8. PRECAUTIONS

### 8.1 ASSEMBLY AND HANDLING PRECAUTIONS

- (1) Do not apply rough force such as bending or twisting to the module during assembly.
- (2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.
- (3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.
- (4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.
- (5) Do not pull the I/F connector in or out while the module is operating.
- (6) Do not disassemble the module.
- (7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.
- (8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.
- (9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.
- (10) When ambient temperature is lower than 10°C may reduce the display quality. For example, the response time will become slowly, and the starting voltage of CCFL will be higher than room temperature.

### 8.2 SAFETY PRECAUTIONS

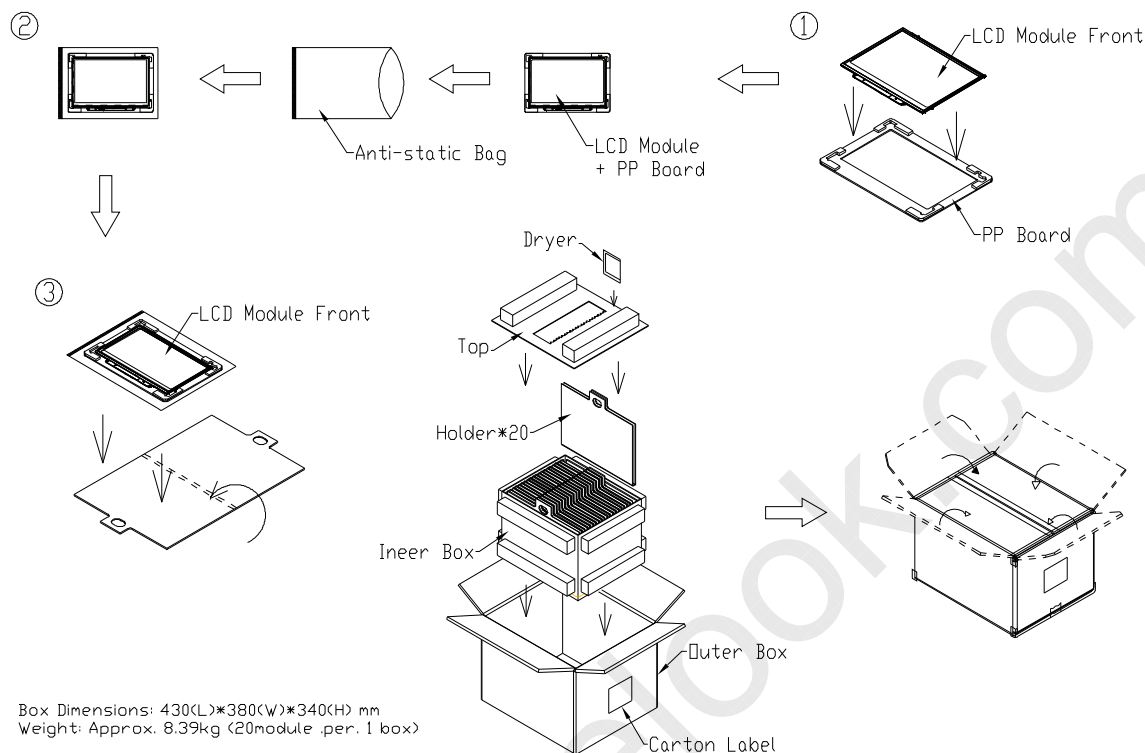
- (1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with converter. Do not disassemble the module or insert anything into the Backlight unit.
- (2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.
- (3) After the module's end of life, it is not harmful in case of normal operation and storage.

### 8.3 OPERATION PRECAUTIONS

- (1) Do not pull the I/F connector in or out while the module is operating.
- (2) Always follow the correct power on/off sequence when LCD module is connecting and operating. This can prevent the CMOS LSI chips from damage during latch-up.
- (3) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with converter. Do not disassemble the module or insert anything into the Backlight unit.

## 9. PACKAGING

### 9.1 CARTON

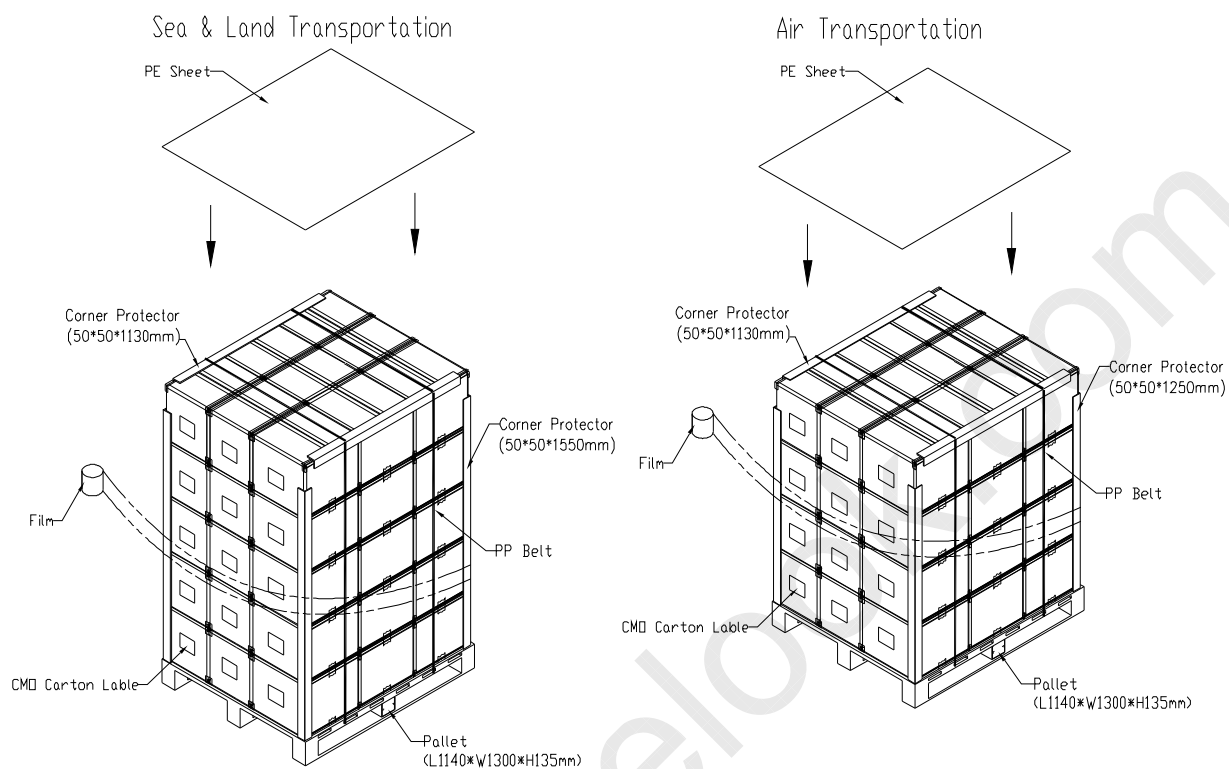


**Figure. 9-1 Packing method**





## 9.2 PALLET



**Figure. 9-2 Packing method**

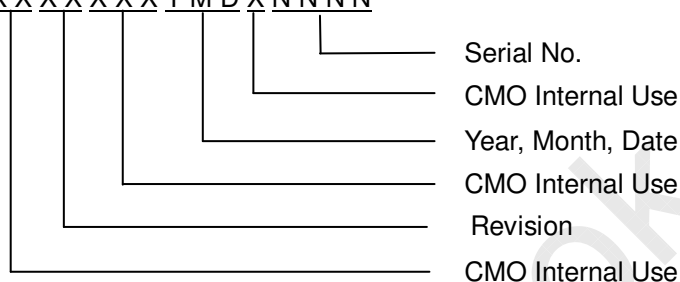
## 10. DEFINITION OF LABELS

### 10.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.



- (a) Model Name: N133I6 - L03
- (b) Revision: Rev. XX, for example: A1, ..., C1, C2 ...etc.
- (c) Serial ID: XXXXXXYMDXNNN



- (d) Production Location: MADE IN XXXX. XXXX stands for production location.

Serial ID includes the information as below:

- (a) Manufactured Date: Year: 1~9, for 2001~2009  
 Month: 1~9, A~C, for Jan. ~ Dec.  
 Day: 1~9, A~Y, for 1<sup>st</sup> to 31<sup>st</sup>, exclude I, O and U
- (b) Revision Code: cover all the change
- (c) Serial No.: Manufacturing sequence of product

## 10.2 CMO CARTON LABEL

  
CHI MEI OPTOELECTRONICS  
  
PO.NO. \_\_\_\_\_  
Part ID. \_\_\_\_\_  
Model Name \_\_\_\_\_  
Carton ID. \_\_\_\_\_ Quantities \_\_\_\_\_  
  
Made in XXXX   
RoHS

